

International Accreditation of Engineering and Technology Programs

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This presentation reviews the international activities to date pertaining to accreditation of engineering and technology programs and summarizes the accreditation procedures within the United States.

INTRODUCTION

ENGINEERS increasingly conduct their work in more than one country and in countries other than where they received their education. These countries have different laws, cultures, procedures, and standards concerning the education and practice of engineering. It is anticipated that the growth of major trading blocks, such as the European Community, the Pacific/Asian area, and the Americas will intensify this development. Also, instant world-wide communication is a strong catalyst for the development of the global practice of engineering and engineering education. It is appropriate for the world's engineering profession to recognize this developing situation and to take steps to ensure the orderly transition into the world-wide practice of engineering and the education of engineers.

Perhaps a method by which this can be accomplished is through the establishment of international accreditation of engineering educational programs, the recognition of academic equivalency between institutions, and reciprocal agreement between engineering licensing agencies.

ENGINEERING ACCREDITATION IN THE UNITED STATES

The official academic accrediting body in the United States is the Council on Post-secondary Accreditation (COPA) under the U.S. Department of Education. This agency is concerned with the uniformity and quality of the accreditation process and for seeing that the number of accrediting agencies does not proliferate, and for determining that no conflict of interest exists among them. COPA has designated the Accreditation Board for Engineering and Technology (ABET) as the sole body for accrediting engineering programs and technology programs. ABET is made up of 26 member and affiliate professional societies. The Institute of Electrical and Electronic Engineers

(IEEE) is one of these societies as are other societies such as the American Society of Civil Engineers (ASCE), The American Institute of Chemical Engineers (AIChE), The National Society of Professional Engineers (NSPE), the American Society for Engineering Education (ASEE), The National Council of Engineering Examiners (NCEE) and more.

In addition to the professional accreditation bodies, COPA recognizes regional interdisciplinary groups which accredit entire program offerings of institutions. ABET recognizes programs that are accredited by these regional groups as meeting general academic standards. This includes programs external to engineering but upon which engineering depends such as physics, chemistry, mathematics, etc.

The IEEE, through its membership in ABET, is given the responsibility for electrical engineering, computer engineering, and electrical technology. It is also recognized as the lead society for several interdisciplinary programs such as bioengineering and systems engineering.

ACCREDITATION OBJECTIVES

In the United States, as stated by ABET [1], the purpose of accrediting is to identify those institutions which offer professional programs in engineering and technology worthy of recognition as such and to accomplish the following specific objectives.

1. To identify to the public, prospective students, educational institutions, professional societies, potential employers, government agencies, and state boards of examiners, the institutions and specific programs that meet minimum criteria for accreditation.
2. To provide guidance for the improvement of the existing educational programs in engineering and for the development of future programs.
3. To stimulate the improvement of engineering education in the United States.

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The Engineering Accreditation Council (EAC) of ABET has established specific minimum criteria for accreditation in several areas. The criteria are further divided into general criteria which all engineering programs must meet and into program criteria for different specialties (e.g. electrical engineering).

INTERNATIONAL ACTIVITIES PERTAINING TO ACCREDITATION

There are now in existence several international agreements [2, 3] related to the equivalency of engineering education. The United States is a participant in these agreements. One of these, between the United States and Canada, has been effectively in place for several years. One between Canada, the United States, Ireland, Australia, New Zealand, and the United Kingdom was initiated in December of 1988 and should be ratified by the time of this presentation. Also, an agreement with the European Federation of Engineering Associations (FEANI) was initiated in 1989 and is in the process of ratification. The United States is represented in the agreement with FEANI by ABET, NSPE, and the NCEE. The NSPE and NCEE are involved due to the fact that accreditation, registration, and practice are normally one organization in countries other than the U.S.

The three United States organizations (ABET, NSPE, and NCEE) also participate with UNESCO's Ibero-American Structure of Support to Engineering Education and the Pan American Federation of Engineering Organizations (UPADI). Their goal is to insure that those United States individuals who are competent to practice are permitted to do so anywhere in the world.

ABET's approach to these international agreements is based on a response to several questions [3]:

1. Does the graduate from the first professional degree program in any country have the same (or better) engineering educational competencies as the graduate of an ABET accredited engineering program?
2. Is there an accreditation or similar system which has appreciable input from, and whose quality is evaluated and maintained as a responsibility of, the active practicing profession and the active participation of the academic members of the profession?
3. Is this evaluation or accreditation carried out on a period basis, and is the evaluation related to the recognition of the quality of the program as education for the profession in the registration process?

It must be noted that these agreements make no comparisons or commitments to registration or to licensing. The comparisons are only in the educational area. Also no attempt is made to determine if the various educational systems are *equal* or to

equate years of study. The approach is to verify that the educational systems are *equivalent* in a broad definition, i.e. that the educational preparation for entry into the profession in one system is comparable to that in another system.

ABET through its International Activities Commission has also conducted evaluation visits to educational institutions outside of the United States. It should be stressed that these visits were taken at the request of the institution and are for evaluation (not accreditation) purposes. ABET does not accredit outside of the U.S. Visits have been conducted in Saudi Arabia, Egypt, and The Netherlands. ABET's objectives are to establish relationships between accrediting bodies in other countries rather than to accredit programs outside of the U.S.

THE IEEE AND INTERNATIONAL ACCREDITATION ACTIVITIES

In the United States, accreditation of engineering programs stirs strong emotions within the engineering community in general and within the IEEE in particular. In addition to those who are concerned for the professional quality of new engineers entering the profession, there are those who view accreditation as a mechanism for potential control of the entry of new electrical engineers into the job market. Since this situation exists at present when accreditation is limited to national questions, any activity regarding international accreditation is destined to be controversial. The IEEE has been involved in the international agreements to date only through its membership in ABET. Individual IEEE members may have been involved in negotiations concerning these agreements and IEEE members have served on the evaluation visits that ABET has conducted to the non-U.S. institutions. However, the IEEE has no official position concerning the question and apparently there is no activity within the IEEE to develop its position. This is unfortunate as the IEEE is an international organization and is the largest of all professional societies. It is probably true also that IEEE members may be the group most affected by the trend toward the international practice of engineering. Many of the graduates of U.S. engineering schools are not U.S. citizens. In the past, most of these individuals have elected to live and to practice their profession in the United States. This is no longer the situation as more and more non-U.S. engineering graduates elect to return to their native country or to some other country. It is also true that many of the companies which employ IEEE members are multi-national, operating in several countries.

It seems appropriate that the IEEE should determine if now is the time to become active and to assume a leadership role in this development situation. One area in which the IEEE can provide leadership is the area of academic equivalency

